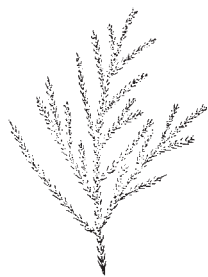


In this series of marine beds we have at the bottom lagoon beds, as I call them, which may represent a similar state of things to what we see at Christchurch, or Poole, or Weymouth, or any place where we have mud banks left dry or even shallow, between each returning tide. We still find here leaves of trees, many of them doubtless overhanging the lagoons, which have so slowly decayed, that they are overgrown with zoophytes; crowds of oysters are met with; we find the remains of shore-crabs, which from our knowledge of existing species, we infer, overran the muddy shore; the callianassa, a prawn-like creature, which bored through the mud; limpets, arcas, corbulars, and many other shell-bearing molluscs, passing their lives, dying, and becoming buried in the sediments of the sheltered lagoons. This lagoon condition went on until the gradual sinking has permitted the ever-encroaching surf to break over the lagoon barrier, to rush in, and in time overwhelm them with rolled shingle and sea-sand. We still trace the lagoon condition for a mile or so east, where it is represented by cigar-ash coloured sands, impregnated with salt, and coloured with this dark tint of carbonaceous matter. These sands contain very perfect remains of branches of a coniferous



BRANCH OF CONIFER

Fig. 3.—*Taxodium*.

tree resembling the genus *Dacrydium* and large pieces of cactus. It should be mentioned that this is the earliest cactus known, and that the spines are found to be still flexible. The sands are in other places crowded with fruits something like those met with at Sheppey. Unfortunately the salt contained in them effloresces and splits all these specimens into fragments.

I may just tell you that at Hengistbury Head we have deeper sea deposits, with sharks' teeth and bones. At Highcliff, Barton, we have relics of a sea swarming with life, myriads of fossil shells may be collected on the cliffs, whilst still further on at Hordwell, we have beds showing that the land arose again, affording suitable conditions for the growth of luxuriant palms, and was the haunt of the alligator, turtle, and other reptiles which are now confined to tropical countries.

Fig. 2 is a view of the Valley of the Bourne at the time referred to above; a description will be given in the next article.

(To be continued.)

## GEOGRAPHICAL CURIOSITIES

DURING the meeting of the International Geographical Congress at Paris in 1875, the National Library opened an exhibition supplementary to that which was held in the Tuileries. Although very rich in documents and modern geographical works, the great national institution did not wish to show simply a duplicate of the collections exhibited at the Tuileries, and it therefore brought out only ancient and rare objects which the rules of the establishment wisely forbid to leave the building. Thus it showed to the public neither its great topographical maps, such as those of Cassini, van der Maelen, &c., nor its recent atlases, its numerous geological maps, its hydrographic charts of the French, English, and other Admiralty Departments. But, thanks to M. Leopold Delisle,

Administrator-General of the National Library, and to M. E. Cortambert, Librarian of the Section of Maps and Plans, there was exhibited in the magnificent Mazarin Gallery a collection unique of its kind, and to which the Departments of Printed Books, Manuscripts, and Engravings contributed. The objects exhibited belonged generally to Group IV., devoted to Historical Geography and the History of Geography, and comprised, besides ancient and modern works and MSS. treating of geography and its history, ancient maps and globes, instruments used by ancient geographers, astrolabes, sundials, &c.

The success of the exhibition in the Mazarin Gallery inspired the Administration of the Library with the happy idea of transforming this temporary exhibition into a permanent institution. This has been established in the ground-floor of what is known as the "Salle des Globes," and in the two rooms which look out upon the great court of the Rue Richelieu, has been recently opened to the public who are admitted on Tuesdays from 10 to 4.

Although the limited space at disposal in these apartments has not permitted the transference of all the objects exhibited in the Mazarin Gallery, and although the Departments of Manuscripts and Printed Books have kept possession of some of the valuable documents lent on the occasion of the Geographical Congress, the exhibition is nevertheless of the greatest interest on account of the rarity of the objects which it contains. Space forbids us to give a complete list of the many objects exhibited, though we are able, through the courtesy of the editor of *La Nature*, to give illustrations and descriptions of a few of the curiosities. There are nearly 500 objects altogether, and those who desire a complete descriptive catalogue of them should procure No. 178 of the French journal just referred to.

On entering the first room of the exhibition the visitor is at once struck with the large dimensions of the two great globes of Coronelli, made, in 1683, by order of the Cardinal D'Estrees, who presented them to King Louis XIV. One of the most curious objects shown in this room is a map of the world, probably of the ninth or tenth century. It is a copy of one which appeared in a Commentary on the Apocalypse written by Beatus, a benedictine of the monastery of Valcovado in Leon, who lived in the eighth century. The original of which the one exhibited (Fig. 1) is a copy, belongs to the library of Turin. It shows strikingly the wonderful notions which these old monks had of the universe, and especially of the earth in which they dreamed their uneventful lives away. Four winds, represented by the grotesque figures seated upon the skin or leathern bottles, and holding shells in their mouths, indicate not the four cardinal points, but the collateral points, where the sun rises and sets at the summer and winter solstices. The orientation of the map, as was for long the custom in the middle ages, places the east at the top, the west below, the north on the left, and the south on the right. A circular ocean, the old river Oceanus of Homer, surrounds the world. If we examine the interior of this strange *mappemonde*, Europe will be seen on the left, Africa on the right, and Asia at the top. The Mediterranean is represented by a very regular parallelogram, extending from east to west. A not less regular branch of this sea occupies the place of the Archipelago, the Black Sea and the Sea of Azov, and bounds Europe on the east, the north-east point of the continent being indicated by the words *Hic Caput Europe* (Europæ). Islands uniformly square are spread over the Mediterranean; we may recognise under strange names, Corcyra, Cyprus, Samos, Sicily, Corsica; the name *Tassís*, which may also be noticed, designates, no doubt, the City of Tarsus, which the author evidently regards as an island.

In the surrounding ocean appear other islands not less fantastical. On the east the island of Crisa and Algure

(for Argire), in allusion to the region of gold and silver of the ancients, in trans-Gangetic India; on the north-east the Island of Tulé, which recalls the famous Thulé; Britannia; then the Island of Scotia, which, however, is not Scotland, as many might be apt to think, but the original home of the Scots, Ireland; for it was not till about the twelfth century that the name was fairly transferred to North Britain.

The orography of Europe is shown, partly in enormous cones, partly in elongated masses, five principal chains, of which only one is named, the Mountains of Gaul (*Montes Galliarum*), without doubt, the Pyrenees. The hydrography is wretchedly meagre. The largest river is

correctly set down as the Danube (Danubiu), but what a curious course is given to it! The second in extent is the Tagus, under the name of *Tavus*, which in utter contempt of geography, discharges itself into the Mediterranean. What considerable river is that which flows towards the east under the name of *Eusis*, a name still applied in Asia to a large river situated almost opposite to this one? Perhaps it may be meant for the Pontus Euxinus itself, the Black Sea; for to mistake a sea for a river was not an uncommon thing with these old geographers.

The political geography is of a higher kind than the physical geography. To speak only of Gaul we find mention made of Aquitaine, Toulouse, Gallia Lugdunensis,

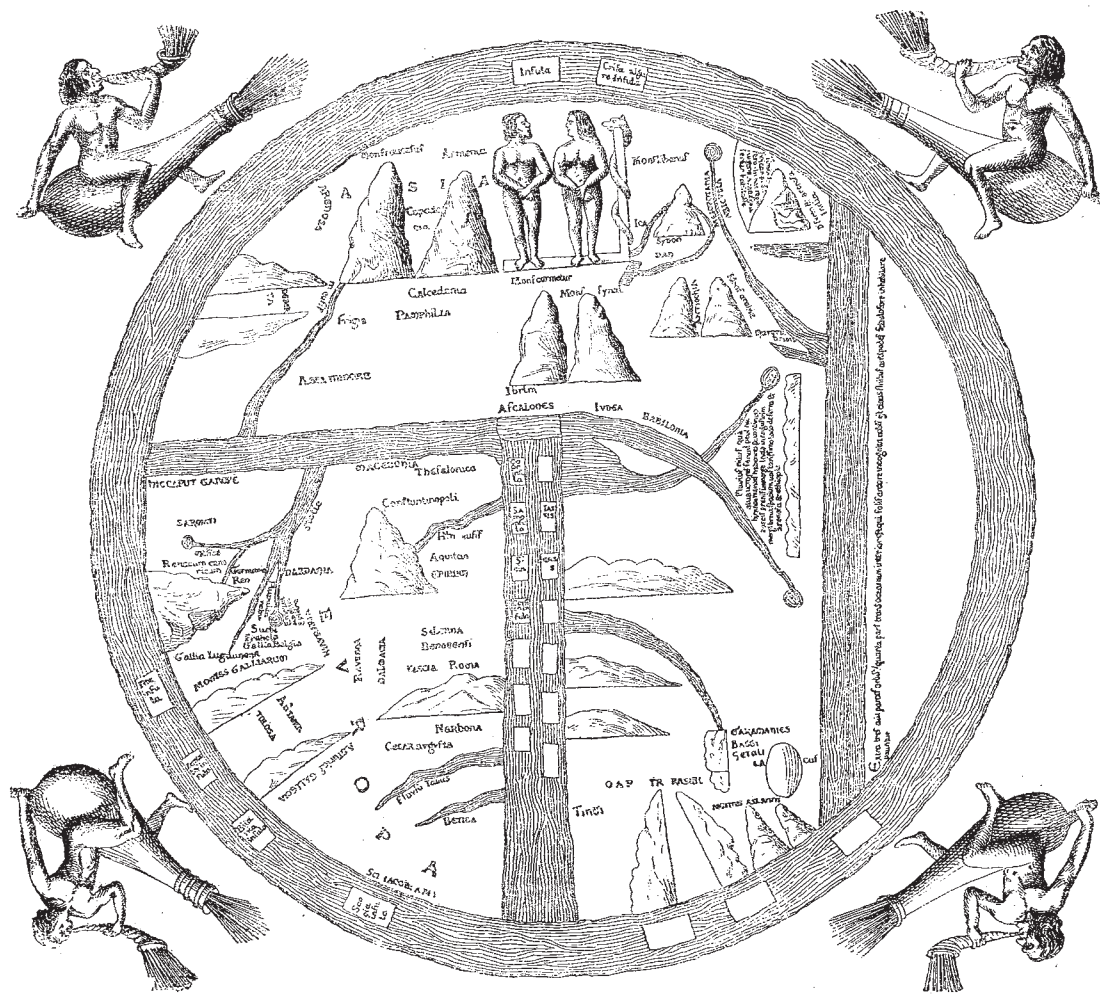


FIG. 1.—Map of the world contained in Beatus's Commentary on the Apocalypse (10th c.).

and Gallia Belgia; we also find *Francia*, which, however, does not stand for France but for Franconia.

In Asia, on the spot, no doubt, where Paradise was supposed to have been placed, appear Adam and Eve, in a grotesque position, and near them the serpent, who, however, has nothing tempting about him. Ten conical mountains surround this curious scene, without names except Libanus, the Caucasus, Carmel, and Sinai. Only three rivers flow in this vast space: first the Jordan, which encompasses Mount Lebanon in a very strange way; the Euphrates, which, though it bears no name, may be divined by the name Mesopotamia written on its

banks; and then the Eusis, that mysterious Eusis to which we referred above.

The countries and the towns are more abundantly treated, though scattered pretty much at hazard. Jerusalem holds the first place, under the abbreviation, *Ihrlm*; Judea, Ascalon, Sidon, Antioch, Asia Minor, Phrygia, Mesopotamia, &c., are represented in situations more or less inexact.

In Africa, what strikes one at first is the Nile, the enormous Nile, divided near its sources into two branches, each issuing from a lake; it falls into the sea by a mouth larger than that of the Mediterranean itself. A note in-



serted between its sources tells of the gold which is mixed with the sand of the river, a vast lake which it traverses, and the sandy deserts of Ethiopia, through which it flows. The only other river seen in Africa is one without a name, which descends from the country of the Garamantes and falls into the Mediterranean; it is probably the Bagradas—the Medjerda of the present day. The mountains of Africa are but poorly shown. After Mount Atlas (*Montes Atlanti*), which is neither in its place nor very markedly brought out, there may be noticed three mountains which abut in the Mediterranean, and two steep and sharp-pointed mountains designated by the scarcely legible

century shows a marked progress on that which we have just described.

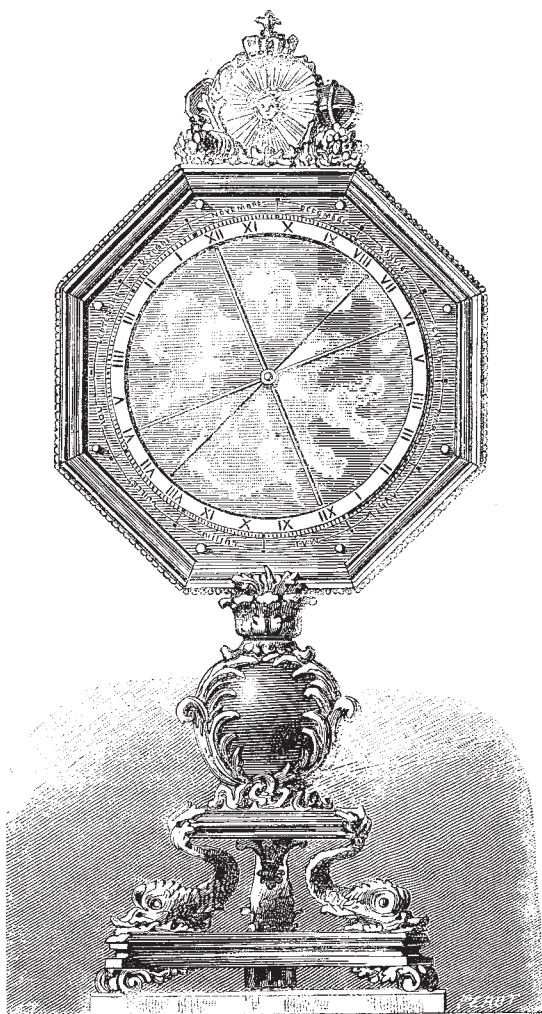


FIG. 2.—Copper cosmographic apparatus.

words, *duo Alpes Contra Arasibi*; this should perhaps be read *Contraria sibi*, i.e., two mountains opposite each other, forming, as it were, two walls between which is a narrow passage. But where exactly are they?

A note inserted in the south of the map tells us that, independently of the three points of the known world, there is beyond the ocean a fourth part which is unknown to us on account of the heat of the sun, and on the confines of which, it is fabled, adds the author, that there are Antipodes.<sup>1</sup>

A reproduction of this map belonging to the 11th

<sup>1</sup> For the above details we are mainly indebted to an article recently published by M. E. Cortambert.

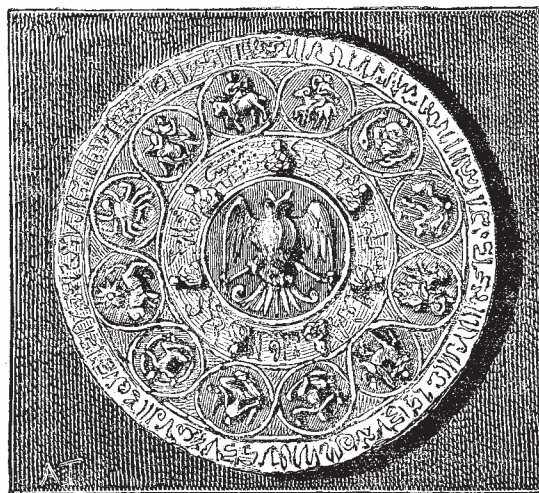


FIG. 3.—Arab zodiac (one-fifth size of original).

The room in which this map is exhibited contains many equally curious objects, some of them of great rarity and

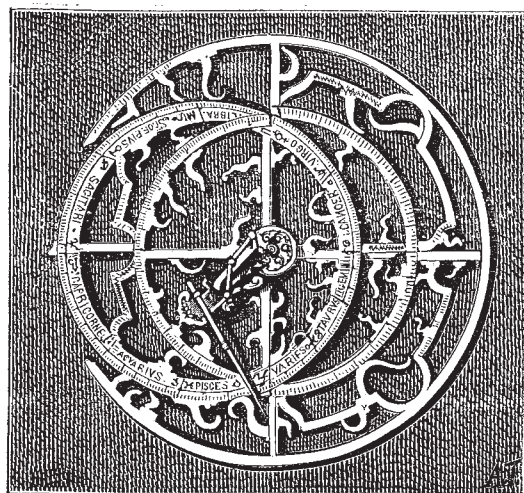


FIG. 4.—French astrolabe (one-fifth size of original).

value. Among these we may mention a copper cosmographic apparatus (Fig. 2) by Thuret, of date 1725. On

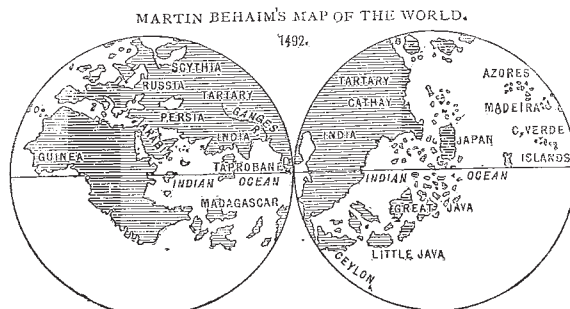


FIG. 5.—Martin Behaim's map of the world.

one face are represented the northern constellations and the signs of the zodiac, as well as the correspondence of





those who take an interest in the progress of geography will doubtless think with us that such an exhibition adds one more to the many attractions of Paris; now that the Loan Collection is closed, nothing at all approaching it exists in London.

#### TEMPERATURES AND OCEAN CURRENTS IN THE SOUTH PACIFIC

IN the *Annalen der Hydrographie und maritimen Meteorologie* (Jahrg. iv., 1876, Heft 6, p. 219), Herr von Schleinitz, a member of the recent expedition in the German corvette *Gazelle*, states his views on ocean temperatures and currents; these are somewhat different from those expressed by Sir C. Wyville Thomson (Proc. Roy. Soc., vol. xxiv.), which are based on the data obtained during the *Challenger* expedition. The *Gazelle*, after leaving Auckland (New Zealand), pursued a course almost due north as far as the Fiji Islands; thence she proceeded to the Samoan Islands, situated at a short distance north-east of Fiji. After a brief excursion to the Tonga group and back, the *Gazelle* (from long.  $172^{\circ} 18' 5''$  W., and lat.  $14^{\circ} 28' 1''$  S.) sailed some 2,500 nautical miles in a south-south-east direction (to long.  $141^{\circ} 11' 4''$  W., and lat.  $45^{\circ} 33' 6''$  S.), after which she took a due easterly, and later on, a south-easterly course, to Magellan's Straits (long.  $80^{\circ} 30' 3''$  W., lat.  $51^{\circ} 41' 6''$  S.). The observations of temperature on the long cruise between the Samoan Islands and the Magellan's Straits are of special interest, as the course taken by the *Gazelle* lies to the south of that pursued by the *Challenger*.

On the first part of the course described, which has a direction nearly coinciding with the meridian, eight series of observations of temperature were made. The bottom profile of this part shows a peculiar absence of elevations, which is all the more remarkable when compared with any similar profile of the same length in the Atlantic.

The conclusion arrived at by Herr von Schleinitz, and based on the results of his observations is, that in the Pacific the arctic deep-sea current crosses the equator in a southerly direction and meets the antarctic current only between lat.  $30^{\circ}$  and  $36^{\circ}$  S. This is just the reverse of what takes place in the Atlantic, as it seems highly probable from the observations of both the *Challenger* and the *Gazelle* expeditions, that in the Atlantic the antarctic deep-sea current passes the equator, running northward of the same to a considerable distance.

Herr von Schleinitz concludes from these latter observations, that if the antarctic deep current enters the North Atlantic, even as a current of limited breadth, it must nevertheless carry enormous quantities of water from the South Atlantic to the North Atlantic, as it is certain that the current has a depth of more than 1,000 fathoms on the average. He then asks the question, What becomes of this mass of water? There is no strong surface current in existence which carries it back to the South Atlantic; even the current caused by the south-east trade winds runs more towards the Gulf Stream than towards the Brazilian coast current. There seems only one hypothesis possible, viz., that a great part of the water flows through the Arctic Sea and Behring's Strait into the North Pacific, and that may be the cause of the preponderance of the arctic current of this ocean over its antarctic one.

The natural conclusion drawn from this is that the South Pacific, in order to complete the whole circle, gives a great part of its waters to the South Atlantic, and as a proof of this it might be pointed out that the ice limit does not approach the equator so much anywhere as it does in the South Atlantic.

The following facts may also be mentioned as in favour of the hypothesis of a certain regular circulation taking place in the manner described. A comparison of the air-isotherms as well as the sea-isotherms both of the Atlantic and Pacific Oceans shows that (1) the South Atlantic is

colder than the North Atlantic; (2) the North Atlantic is warmer than the North Pacific; (3) the South Pacific is warmer than the South Atlantic.

The higher temperature of the North Atlantic Ocean has hitherto been generally explained by the influence of the Gulf Stream. But a similar current exists in the North Pacific, and yet this is colder. There is no doubt that the Gulf Stream has a warming effect on some European coasts, but it is very probable that considering its comparatively small breadth of about 100 nautical miles, and shallow depth of only 100 fathoms, the stream is far too insignificant to be able to exercise a perceptible influence upon the climate of the whole North Atlantic and of the coasts surrounding this ocean.

On the other hand it does not seem to have been sufficiently appreciated hitherto, that a very large part of the North Atlantic is filled by water, which has crossed the equator, even if at a considerable depth. However trifling the rise in the temperature of this water, as caused by the passage over the equator, may be, when compared to the general temperature of the South Atlantic, it is nevertheless a fact that there is an important amount of heat, which the South Atlantic loses and the North Atlantic gains, on account of the very large extension of the current. Nor can it be objected with regard to this, that the mean temperature of that mass of water is probably below the mean temperature of air in the North Atlantic, because there is no question of absolute heat, but only of difference of temperatures between the North and South Atlantic.

The excess of water in the North Atlantic, which is not carried back into the South Atlantic by the surface-currents, and which passes through the Arctic Ocean (where it loses the heat it possessed) into the North Pacific, causes a decrease of temperature in the latter, and, proceeding southward, i.e., again crossing the equator and thus absorbing heat, produces an increase of temperature in the South Pacific. Finally, the South Pacific gives back to the South Atlantic a part of that water at a very low temperature, which originally flowed from the latter into the North Atlantic perceptibly heated, on account of its passage through the tropics.

This circulation, however, is not to be understood as if the lowest strata of all the oceans took part in it; on the contrary, there are doubtless only single currents in the lower strata which follow it, while others may flow in an opposite direction. Further observations will throw light on these hypotheses; those made up to the present are yet insufficient and at times even contradictory. At the same time it must not be overlooked that a constant exchange of water between the lower and upper strata, i.e., currents flowing in a vertical direction, are proved to exist beyond doubt, particularly in certain zones.

In conclusion Herr von Schleinitz considers the oceanic system of currents to be evidently a very complicated and at present obscure one, upon which the observations made on board the *Challenger* and the *Gazelle* throw but a very faint light.

The second part of the course pursued by the *Gazelle*, as described above, did not differ sufficiently in latitude, and therefore could not furnish any data which would be useful or decisive on the subject in question. However, the observations which were made give results in complete accordance with the hypothesis referred to above.

#### ON THE MEANS OF PROTECTION IN FLOWERS AGAINST UNWELCOME VISITORS

THE phenomena relating to this subject, which have important bearings on the doctrine of selection, have recently been discussed by M. Kerner in an interesting monograph communicated to the *Festschrift* published on occasion of the twenty-fifth anniversary of the Zoo-